REPORT ON THE MISSION TO FELCRA/MALAYSIA

from 1st to 22nd March 1991

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LIST OF PERSONS ENCOUNTERED

WORLD BANK

Phillipe BOYER : Sr. Tree Crop Specialist

F.E.L.C.R.A.

Kuala Lumpur

Director General: DATO MUSTAPHA JUMAN
Deputy Director General: ABD. WAHID AZAHARI
Planning: MOKTAR BIN AHMAD (Director)
TAN SAI ENG
Monitoring evaluation: ARIFF (Director)
TONG AH LOOI
Technical Services: NG BIAN HOO (Director)
Agricultural Advisory Service : KOK KAM SANG (Director)
ZAKARIA
RAZAK

Pahang Ulu Jenut: MOH ZIN
SADNI

Perlis Kedah KAMARUDIN - SHAHAROM - JUZILMAN
Ulu Pauh: SWAILI

Terenganu AHMAD
Sungai Dura: ESA ISMAIL

Johor TUAN HADJI DAHLAN
ZUMANI
MOHD HATTA
Bukit Pedoman: PARDI BIN HJ. NASIR
BPI : AZLAN
BPII : MANO KUMAR
BPIII: AHMED SADIRO

R.R.I.M.

Dr. WAN RAHMAN,	Deputy Director Biology Division
Dr. ISMAIL HASHIM,	Exploitation Tapping
Dr. YEANG,	Biotechno and Cell Biology.

SCOPE OF THE MISSION

The mission to FELCRA (Federal Land Consolidation and Rehabilitation Authority) was carried out from 1st to 22nd March 1991, at the request of the World Bank.

With a view to assessing hevea tapping techniques designed to reduce manpower requirements, the mission concentrated on defining methods of setting up and monitoring demonstration plots for tapping at reduced frequency compensated for by stimulation.

CURRENT TAPPING SITUATION AT FELCRA

Around 30,000 hectares are currently being tapped, out of a total of 80,000 hectares of hevea. On the various plantations we visited, we saw:

- average production levels (1,400 kg/ha),
- poor quality tapping (many wounds and excessive bark consumption, 30 to 35 cm/yr),
- retapping on inadequately regenerated bark (after 7 to 8 years),
- a lack of tappers (10 to 20% of tasks not tapped and trees opened 1 to 2 years late),
- a significant proportion of dry trees on certain plantations, especially in the North where the dry season is more marked.
- more or less overlapped clone distribution within the tapping tasks.

Tapping is mostly carried out in 1/2S d/2 6d/7, throughout the year when conditions permit. On one plantation, we saw d/1 tapping. A tapping task comprises 500 to 600 trees, but we saw up to 780 trees per task in some plantation assistants' record books (these were contract tappers, not settlers). The poor quality tapping can be explained by the total nonexistence of incentive bonuses. The rainguards (RRIM type) installed on some plantations are only effective in the first year; thereafter, they tear as the tree grows. The opening height varies from 1.40 m to 1.70 m and there seems to be no technical manual defining the norms to be followed for tapping or for any other hevea growing operations.

A tapper's salary amounts to:

$7/day ($8 in category 2 and $9 in category 1)
+ $60/month - $15/day's absence
+ $0.4/kg of additional rubber over 15 kg/day
+ $0.15/kg of wet scrap.

The kg/tapper/day varies from 15 to 18 and tapping costs from 65 to 85% of production costs ($1/kg).

REDUCED TAPPING FREQUENCY

Switching to a reduced tapping frequency with stimulation therefore seems to be perfectly justified in the circumstances and should make it possible to:

- reduce tapper requirements
- reduce production costs
- slightly increase hevea yields by modifying the stimulation frequencies
- extend the economic lifespan of the trees by reducing bark consumption
- increase rubber production by introducing tapping in all areas at the appropriate time and tapping all the tasks regularly, made possible through the reduction in manpower requirements.

As soon as the powerful production stimulant, ETHREL, came on the scene in 1970, the trials conducted in West Africa led to this technique being extended throughout the hevea growing areas of Cameroon and the Ivory Coast by 1975. Since then, stimulated tapping in 1/2S d/3 6d/7 has easily proved its long-term effectiveness, even when applied as soon as trees are opened. Improvements to this technique are now leading to the introduction of 1/2S d/4 or d/5 tapping.

No long-term negative after-effects have been observed on production. Indeed, unlike what is practised elsewhere, the low dose stimulation used merely increases production slightly, rather than doubling yields, obtained by stimulated 1/2S d/2 tapping.

The reduction in the number of tappings per year leads to an increase in the area tapped by each tapper, hence manpower productivity rises, as shown in the following table.

Tapping frequency	d/2	d/3	d/4
Number of tappings/yr (270 days/yr)	135	90	67
Bark consumption (cm/yr)	23	16	13
Area tapped per tapper (300 trees/ha, 600 trees/task)	4 ha	6 ha	8 ha
Number of tapper days/ha	68	45	34
kg/tapper/day (1,600 kg/ha)	24	36	48

A reduction is also seen in bark consumption, along with an increase in the productive lifespan of the heveas.

However, the complete effectiveness of this system is subject to several parameters:

- clone type (problem of clone mixtures)
- tree age
- tapping quality, and as a general rule, good supervision
- environmental conditions (soil fertility and rainfall distribution).

The choice of site for the demonstration plots and the choice of treatments to be compared were made after taking into account the various parameters, so as to cover all the possible situations likely to be encountered at FELCRA.

DEMONSTRATION PLOTS

We visited 14 plantations, certain of which had already been selected by FELCRA. 8 of the 14 plantations were chosen. A 9th site is to be chosen by FELCRA in the North (Annex).

The sites chosen are representative of a large proportion of the FELCRA plantations (geographical location, tree and clone age).

The treatments opted for were those applied at industrial level on plantations in West Africa. In the case of plots with regenerated bark, upward tapping was introduced to overcome the problems of poor bark regeneration and dry panels.

On opening, tapping in 1/2S d/2 will be compared to tapping in 1/2S d/3 stimulated 4 to 6 times per year and tapping in 1/2S d/4 stimulated 6 times per year.

On virgin bark, tapping in 1/2S d/2 will be compared to tapping in 1/2S d/3 stimulated 6 times per year and tapping in 1/2S d/4 stimulated 8 times per year.

On regenerated bark, tapping in 1/2S d/2 will be compared to tapping in 1/2S d/3 stimulated 10 times per year, in 1/2S d/4 stimulated 10 times per year and upward 1/4S tapping in d/3 or d/4 stimulated 10 to 12 times per year.

The detailed protocol describing the plots and how they are to be run is given in the annex. These demonstration plots were designed on the basis of a tapping task at a given frequency, with 3 or 4 replications, so as to ensure normal production monitoring (per tapping task) and a solid statistical design.

In addition to these demonstration plots, the BUKIT PEDOMAN III plantation (268 ha) will be opened in June 1991 in 1/2S d/3 6d/7 with 4 stimulations per year at 2.5% active ingredient; stimulation will be applied at a rate of 0.7 g of stimulant to the regenerated tapping panel just above the tapping cut. Given the crucial problem of manpower shortages, this plantation will be a pilot plantation.

LIAISON WITH RRIM

A meeting with RRIM was held on 21/03/90. It was attended by: RRIM - WAN RAHMAN / ISMAIL HASHIM / YEANG; FELCRA - KOK KAM SANG / ZAKARIA; IRCA-CIRAD - ESCHBACH

The purpose of the visit was to inform RRIM of the arrangements made for choosing the number of demonstration plots, their locations and the tapping frequencies adopted. RRIM declared that it was perfectly satisfied to see FELCRA adopting technology that had been recommended for the past few years, so as to cope with manpower reductions. The choice of treatments was not questioned. As to the question of whether two years was long enough for the large-scale development of this technique, it was pointed out that the results obtained in Africa over the past 15 years were perfectly satisfactory. RRIM renewed its support to FELCRA and is ready to provide assistance in this operation. The production results will be passed on to RRIM, at its request. The plots will be monitored jointly by FELCRA and IRCA.

CONCLUSIONS

The operating conditions seen at FELCRA, the choice of demonstration plots and the tapping frequencies adopted will ensure a good probability of success of using this new technology within a period of two years.

The protocols in the annex were explained and left with those in charge of setting up and monitoring these blocks at FELCRA. In view of the substantial heterogeneity seen in the field, the different tapping frequencies can only be attributed to the different tasks if certain data are made available beforehand. It was decided that FELCRA would send me the following as soon as possible:

- for trees at the time of opening: the total number of trees and number per hectare for each of the 12 tapping tasks.
- for trees already opened: production per tapping task over at least two or three months.
- meteorological data, so that the annual stimulations can be spaced properly.

There should be no prior statistical difference between the treatments at the time the plots are set up.

FELCRA was also asked to check and complete the protocol for each demonstration plot for:

- soil: series, category, description
- mean rainfall 1985-1990
- clones and their distribution
- background of the blocks
- panel diagrams

As soon as we receive details of how the different tapping tasks have been distributed in the field, along with the preliminary data, the statistical design for the different plots will be sent to FELCRA immediately. FELCRA should indicate each tapping task in the field by a coloured circle on each border tree corresponding to the treatment. The different treatments should start at the beginning of May.

Each day, production should be recorded on the daily production record sheet figuring in the protocol. The dry rubber weight obtained for each tapping task should then be noted down on the monthly production sheet. For better trial monitoring, a copy of the monthly production sheets for each demonstration plot should be sent to Paris for recording, cumulation and statistical calculation. A software package will be developed and demonstrated during the next mission.

The draft schedule for the operation is therefore as follows:

April 1991	:	Dispatching of documents and completion of the protocols.
May 1991	:	Setting up of the demonstration plots in the field, and check mission.
December 1991	:	Second technical assistance mission, assessment of the initial results.
May-June 1993	:	Third technical support mission, assesment of results and second phase recommendations.

LIST OF SCHEMES VISITED

5 March	NEGERI SEMBILAN	-	Ulu Rokan
		-	Temeris 2
6 March	PAHANG	-	Ulu Jenut
12 March	PERLIS	-	Teluk Yu
		-	Insitu Kok
		-	Bukit Sawak
		-	Ulu Pauh 1 and 2
13 March	KEDAH	-	Bukit Tampoi 1 and 2
16 March	TERENGANU	-	Songai Dura
18 March	JOHOR	-	Bukit Pedoman 1, 2 and 3.

LIST OF SCHEMES RETAINED

NEGERI SEMBILAN	-	Ulu Rokan
PAHANG	-	Ulu Jenut
PERLIS	-	Ulu Pauh 1 and 2
KEDAH	-	Bukit Tampoi 1 and 2
JOHOR	-	Bukit Pedoman 1 and 3.
	-	Bukit Keremoiyang.

Age of trees Panel	Opening Virgin bark				Virgin bark	Regenerated bark			
Clone	Mixed					RRIM 600	Mixed	GT 1	RRIM 600
N° SCHEME	1 BENDANG NAW	2 ULU ROKAN	3 ULU JENUT	4 BUKIT PEDOMAN III	5 BUKIT PEDOMAN I	6 ULU PAHAU	7 BUKIT TAMPOI I	8 BUKIT TAMPOI II	9 BUKIT KEREMOI YANG
1/2S d/2 Non stimul.	X	X	X	X	X	X	X	X	X
d/3, 2.5%, 4/y	X	X	X	X					
6/y	X	X	X	X	X				
10/y						X	X	X	
d/4, 2.5%, 6/y	X	X	X	X					
8/y					X				
10/y						X	X	X	X
1/4 UP d/3, 5%, 10/y						X	X	X	X
1/4 UP d/4, 5%, 12/y								X	X

1/2S : half spiral 1/4S UP : quarter spøiral, upward tapping
d/2 d/3 d/4 : frequency of tapping
2.5 and 5% : concentration of active ingredient of stimulant
4, 6, 8, 10 and 12/y : number of stimulation by year.

A N N E X E S

- Protocol of demonstration blocks n° 1 to 9
- Technical form on control of tapping quality

Protocol

Demonstration Plot No. 1

1.Objective

This demonstration plot aims to reduce the need of workers by reducing the frequency of tapping and using stimulation to maintain the level of yield per hectare obtained with classical S/2 d/2.

2.Localisations

State : KEDAH Scheme : BENDANG DAN

3.Environmental conditions

* Soil Serie : Class :
  Description :

* Climate Rainfall (1986-1990) (mm) ; days (1957-90)

Month	1	2	3	4	5	6	7	8	9	10	11	12
Total mm	12	36	68	187	229	162	172	278	318	360	266	69
Number of days	0	1	2	9	12	7	8	8	13	11	9	3

Total 2 150 mm, 82 days

4.History of demonstration plots

* Clones:

* Planting Year :
  Method :
  Budding :
  Stand/ha at planting :
  Planting distance :

* Opening Year : May 1991
  Height : 1,40 m
  Tapping: 1/2 S d/2

5. Treatments

4 treatments (1234) replicated 3 times (ABC) : 12 tasks of about 500 trees (1 treatment per task)

Number	Colour	Tapping	Stimulation	Pannel
1	Green	1/2S d/2	No	BO-1
2	Black	1/2S d/3	ET 2.5%Pa 0.7(1) 4/y	"
3	Yellow	1/2S d/3	ET 2.5%Pa 0.7(1) 6/y	"
4	Red	1/2S d/4	ET 2.5%Pa 0.7(1) 6/y	"

Length of spiral : 1/2S on panel A at 1,40 m from the soil.

Frequency of tapping : d/2 6 d/7, d/3 6 d/7, d/4 6 d/7

Bark consumption : with 300 tapping days per year.

Frequency	mm/tapping	Number tapping	cm/month	cm/year	cm/6 months
d/2	1.5	150	1.9	23	12
d/3	1.6	100	1.3	16	8
d/4	1.7	75	1.1	13	7

Half-yearly bark consumption guide had to be traced.

Depth of tapping : 1 to 1,5 mm to cambium.

Stimulation : ETHREL (Rhône-Poulenc) ready mix 5% a.i. (CEP) diluted to 2.5% with water or ready mix 2.5% (CEP).

Pannel application of 0,7 g of stimulant per tree on 1 cm of renewing bark just above the tapping cut. No lace removal.

Date of application excluding the wintering period. First stimulation after refoliation, then every two or four months.Not during the heavy raining season. Application two or three days before the tapping day.

Month	1	2	3	4	5	6	7	8	9	10	11	12
4/y				X			X		X		X	
6/y				X			X	X	X		X	X

6. Preliminary data

For the twelve tasks :

* Number of tappable trees and total trees.
* Girth of tappable tree (with three dots).

7. Controls

Yield — Task yield is recorded at every tapping. Latex is weighed and the DRC of latex from each task is determined by metrolac method to obtain the weight of latex dry rubber. Cup lump of each task is weighed and a coefficient of 0.5 is applied to obtain the weight of cup lump dry rubber.

Girth — One measurement at 1.70 m above the ground at the beginning of trial and at yearly intervals.
All tappable trees are measured.

Stand per ha by task every six months : May and November
- total trees
- trees in tapping
- dry trees.

Annexes :
- Calendar of tapping days.
- Map of treatment repartition.
- Diagram of pannel.

Calendar of tapping

For demonstration plots number 1 to 4

12 tapping tasks from A1 to C4.

Replications must be tapped on differents days: influence of climate and rainy days will be included in replications and not in treatments.

Tapper	a	b	c	d	e
Monday	A1	C1	A2	A3	A4
Tuesday	B1		B2	B3	B4
Wednesday	A1	C1	C2	C3	C4
Thursday	B1		A2	A3	
Friday	A1	C1	B2	B3	A4
Saturday	B1		C2	C3	B4
Sunday					
Monday	A1	C1	A2	A3	C4
Tuesday	B1		B2	B3	
Wednesday	A1	C1	C2	C3	A4
Thursday	B1		A2	A3	B4
Friday	A1	C1	B2	B3	C4
Saturday	B1		C2	C3	

On monday, tapper "a" taps replication A of traitement 1
tapper "b" taps replication C of traitement 1
On tuesday tapper "a" taps replication B of traitement 1

With friday tapping rest or in case of rainy day, treatments are shifted.

Daily yield recording

SCHEME :						Date :	
Name Tapper Number	PLOT	Latex			Cuplump		TOTAL dry rubber
		Fresh	DRC	Dry	Fresh	Dry	
TOTAL							

Monthly yield recording

Tr	1				2				3				4				5			
Re	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
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Protocol

Demonstration Plot No. 2

1.Objective

This demonstration plot aims to reduce the need of workers by reducing the frequency of tapping and using stimulation to maintain the level of yield per hectare obtained with classical S/2 d/2.

2.Localisations

State : NEGRI SEMBILAN Scheme : ULU ROKAN

3.Environmental conditions

* Soil Serie : Rasak Class :
  Description : Clay, deep, well drained
  Terrain: Undulating

* Climate Rainfall (1985-~~1990~~ 89); days (1986-89)

Month	1	2	3	4	5	6	7	8	9	10	11	12
Total mm	119	69	809	187	157	82	65	63	160	175	206	110
Number of days	12	6	17	17	12	10	7	13	14	12	15	12

Total 1593 mm, 146 days

4.History of demonstration plots

* Clones: RRIM 600 (70%) and GT 1 (30%)

* Planting Year :1982
  Method :Budded stump (polybag)
  Budding :1982
  Stand/ha at planting : 456
  Planting distance :

* Opening Year : May 1991
  Height : 1,40 m

5. Treatments

4 treatments (1234) replicated 3 times (ABC) : 12 tasks of about 500 trees (1 treatment per task)

Number	Colour	Tapping	Stimulation	Pannel
1	Green	1/2S d/2	No	BO-1
2	Black	1/2S d/3	ET 2.5%Pa 0.7(1) 4/y	"
3	Yellow	1/2S d/3	ET 2.5%Pa 0.7(1) 6/y	"
4	Red	1/2S d/4	ET 2.5%Pa 0.7(1) 6/y	"

Length of spiral : 1/2S on panel A at 1,40 m from the soil.

Frequency of tapping : d/2 6 d/7, d/3 6 d/7, d/4 6 d/7

Bark consumption : with 300 tapping days per year.

Frequency	mm/tapping	Number tapping	cm/month	cm/year	cm/6 months
d/2	1.5	150	1.9	23	12
d/3	1.6	100	1.3	16	8
d/4	1.7	75	1.1	13	7

Half-yearly bark consumption guide had to be traced.

Depth of tapping : 1 to 1,5 mm to cambium.

Stimulation : ETHREL (Rhône-Poulenc) ready mix 5% a.i. (CEP) diluted to 2.5% with water or ready mix 2.5% (CEP).

Pannel application of 0,7 g of stimulant per tree on 1 cm of renewing bark just above the tapping cut. No lace removal.

Date of application excluding the wintering period. First stimulation after refoliation, then every two or four months.Not during the heavy raining season. Application two or three days before the tapping day.

Month	1	2	3	4	5	6	7	8	9	10	11	12
4/y				X			X		X		X	
6/y				X			X	X	X		X	X

6. Preliminary data

For the twelve tasks :

* Number of tappable trees and total trees.
* Girth of tappable tree (with three dots).

7. Controls

Yield — Task yield is recorded at every tapping. Latex is weighed and the DRC of latex from each task is determined by metrolac method to obtain the weight of latex dry rubber. Cup lump of each task is weighed and a coefficient of 0.5 is applied to obtain the weight of cup lump dry rubber.

Girth — One measurement at 1.70 m above the ground at the beginning of trial and at yearly intervals.
All tappable trees are measured.

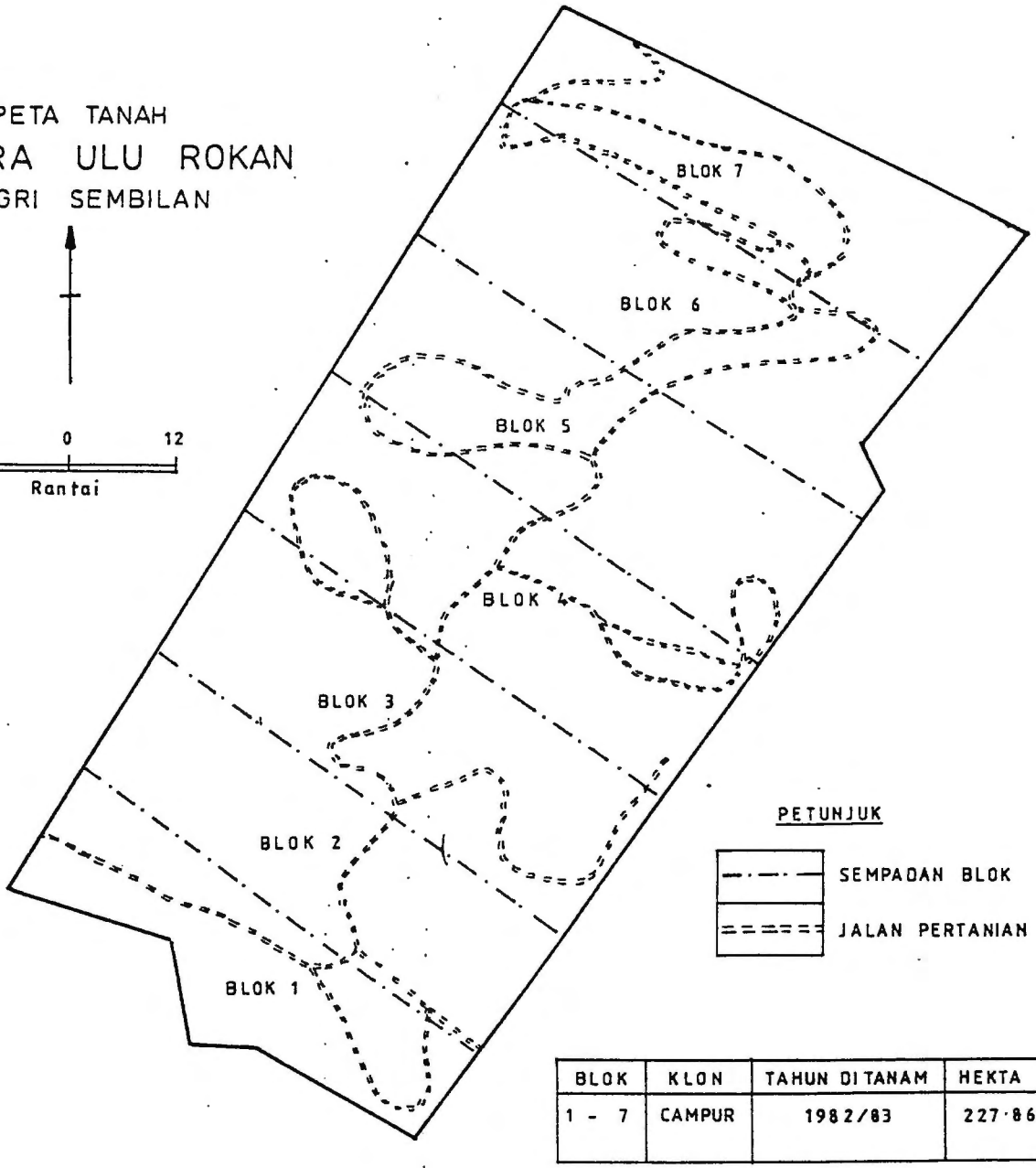
Stand per ha by task every six months : May and November
- total trees
- trees in tapping
- dry trees.

Annexes :
- Calendar of tapping days.
- Map of treatment repartition.
- Diagram of pannel.

PETA TANAH

FELCRA ULU ROKAN

NEGRI SEMBILAN



BLOK	KLON	TAHUN DITANAM	HEKTA
1 - 7	CAMPUR	1982/83	227·865

Soil Unit.	Soil Characteristics.
Rasak series.	Clay; deep; on undulating to hilly terrain; well drained.

Protocol

Demonstration Plot No. 3

1.Objective

This demonstration plot aims to reduce the need of workers by reducing the frequency of tapping and using stimulation to maintain the level of yield per hectare obtained with classical S/2 d/2.

2.Localisations

State : PAHANG Scheme : **ULU JENUT**

3.Environmental conditions

* Soil Serie : Batu Lapan Class :
  Description : Clay-loam top-soil, clay sub-soil,
  laterites met 50 - 100 cm depth
  Terrain: Rolling

* Climate Rainfall (1985-~~1990~~); (mm 88) days (1986-88)

Month	1	2	3	4	5	6	7	8	9	10	11	12
Total mm	120	76	154	176	171	153	114	140	236	226	261	189
Number of days	8	7	13	13	13	9	8	11	13	13	15	13

Total 2.017 mm, 140 days

4.History of demonstration plots

* Clones: RRIM 600 (50%), GT 1 (45%) and others (5%)

* Planting Year :1984
  Method :Budded stump (polybag)
  Budding :1984
  Stand/ha at planting : 450
  Planting distance : 9.14 x 2.13 m

* Opening Year : May 1991
  Height : 1,40 m

5. Treatments

4 treatments (1234) replicated 3 times (ABC) : 12 tasks of about 500 trees (1 treatment per task)

Number	Colour	Tapping	Stimulation	Pannel
1	Green	1/2S d/2	No	BO-1
2	Black	1/2S d/3	ET 2.5%Pa 0.7(1) 4/y	"
3	Yellow	1/2S d/3	ET 2.5%Pa 0.7(1) 6/y	"
4	Red	1/2S d/4	ET 2.5%Pa 0.7(1) 6/y	"

Length of spiral : 1/2S on panel A at 1,40 m from the soil.

Frequency of tapping : d/2 6 d/7, d/3 6 d/7, d/4 6 d/7

Bark consumption : with 300 tapping days per year.

Frequency	mm/tapping	Number tapping	cm/month	cm/year	cm/6 months
d/2	1.5	150	1.9	23	12
d/3	1.6	100	1.3	16	8
d/4	1.7	75	1.1	13	7

Half-yearly bark consumption guide had to be traced.

Depth of tapping : 1 to 1,5 mm to cambium.

Stimulation : ETHREL (Rhône-Poulenc) ready mix 5% a.i. (CEP) diluted to 2.5% with water or ready mix 2.5% (CEP).

Pannel application of 0,7 g of stimulant per tree on 1 cm of renewing bark just above the tapping cut. No lace removal.

Date of application excluding the wintering period. First stimulation after refoliation, then every two or four months.Not during the heavy raining season. Application two or three days before the tapping day.

Month	1	2	3	4	5	6	7	8	9	10	11	12
4/y				X			X		X		X	
6/y				X			X	X	X		X	X

6. Preliminary data

For the twelve tasks :

* Number of tappable trees and total trees.
* Girth of tappable tree (with three dots).

7. Controls

Yield — Task yield is recorded at every tapping. Latex is weighed and the DRC of latex from each task is determined by metrolac method to obtain the weight of latex dry rubber. Cup lump of each task is weighed and a coefficient of 0.5 is applied to obtain the weight of cup lump dry rubber.

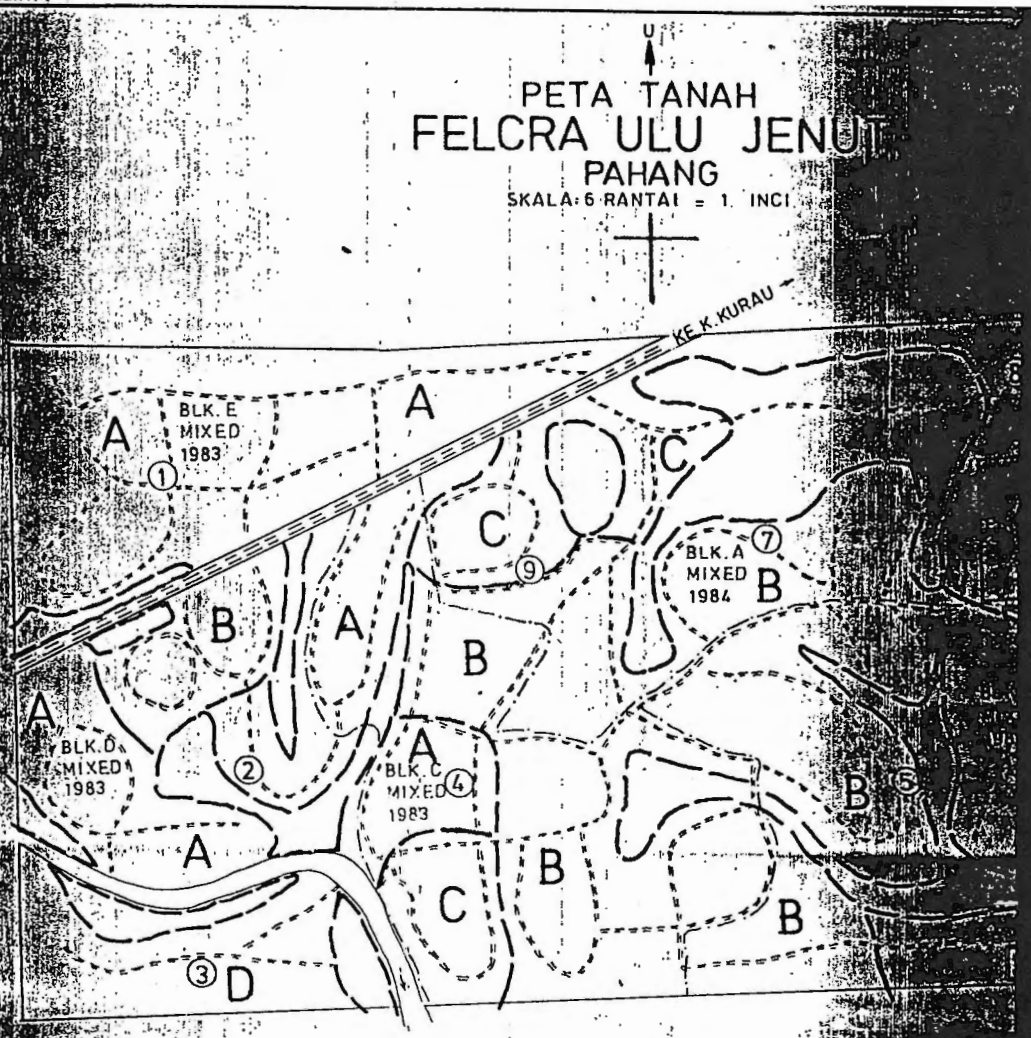
Girth — One measurement at 1.70 m above the ground at the beginning of trial and at yearly intervals.
All tappable trees are measured.

Stand per ha by task every six months : May and November
- total trees
- trees in tapping
- dry trees.

Annexes :
- Calendar of tapping days.
- Map of treatment repartition.
- Diagram of pannel.

PETA TANAH
FELCRA ULU JENUT
PAHANG

SKALA: 6 RANTAI = 1 INCI



SOIL MAPPING UNIT

SOIL CHARACTERISTICS

A : Chat Series	clay loam top-soil; clay sub-soil; deep; Rolling terrain; well drained; slightly eroded.
B : Batu Lapan Series	clay loam top-soil; clay sub-soil; moderately deep; laterites met between 50 to 100 cm depth; Rolling terrain; slightly eroded.
C : Chert and Mudstone	
D : Padang Besar Series	clay loam top-soil; clay sub-soil; shallow; laterites met within 50 cm depth; Rolling terrain; slightly eroded.

Protocol

Demonstration Plot No. 4

1.Objective

This demonstration plot aims to reduce the need of workers by reducing the frequency of tapping and using stimulation to maintain the level of yield per hectare obtained with classical S/2 d/2.

2.Localisations

State : JOHOR Scheme : BUKIT PEDOMAN III

3.Environmental conditions

* Soil Serie : Kuala Brang Class :
  Description :

  Terrain: Hilly

* Climate Rainfall (1985-1990): BPT

Month	1	2	3	4	5	6	7	8	9	10	11	12
Total mm	332											
Number of days												

4.History of demonstration plots

* Clones: RRIM 600 (50%), GT 1 (45%) and others (5%)

* Planting Year :1984
  Method :Budded stump (polybag)
  Budding :1984
  Stand/ha at planting : 450
  Planting distance : 9.14 x 2.13 m

* Opening Year : May 1991
  Height : 1,40 m

5. Treatments

4 treatments (1234) replicated 3 times (ABC) : 12 tasks of about 500 trees (1 treatment per task)

Number	Colour	Tapping	Stimulation	Pannel
1	Green	1/2S d/2	No	BO-1
2	Black	1/2S d/3	ET 2.5%Pa 0.7(1) 4/y	"
3	Yellow	1/2S d/3	ET 2.5%Pa 0.7(1) 6/y	"
4	Red	1/2S d/4	ET 2.5%Pa 0.7(1) 6/y	"

Length of spiral : 1/2S on panel A at 1,40 m from the soil.

Frequency of tapping : d/2 6 d/7, d/3 6 d/7, d/4 6 d/7

Bark consumption : with 300 tapping days per year.

Frequency	mm/tapping	Number tapping	cm/month	cm/year	cm/6 months
d/2	1.5	150	1.9	23	12
d/3	1.6	100	1.3	16	8
d/4	1.7	75	1.1	13	7

Half-yearly bark consumption guide had to be traced.

Depth of tapping : 1 to 1,5 mm to cambium.

Stimulation : ETHREL (Rhône-Poulenc) ready mix 5% a.i. (CEP) diluted to 2.5% with water or ready mix 2.5% (CEP).

Pannel application of 0,7 g of stimulant per tree on 1 cm of renewing bark just above the tapping cut. No lace removal.

Date of application excluding the wintering period. First stimulation after refoliation, then every two or four months.Not during the heavy raining season. Application two or three days before the tapping day.

Month	1	2	3	4	5	6	7	8	9	10	11	12
4/y				X			X		X		X	
6/y				X			X	X	X		X	X

6. Preliminary data

For the twelve tasks :

* Number of tappable trees and total trees.
* Girth of tappable tree (with three dots).

7. Controls

Yield — Task yield is recorded at every tapping. Latex is weighed and the DRC of latex from each task is determined by metrolac method to obtain the weight of latex dry rubber. Cup lump of each task is weighed and a coefficient of 0.5 is applied to obtain the weight of cup lump dry rubber.

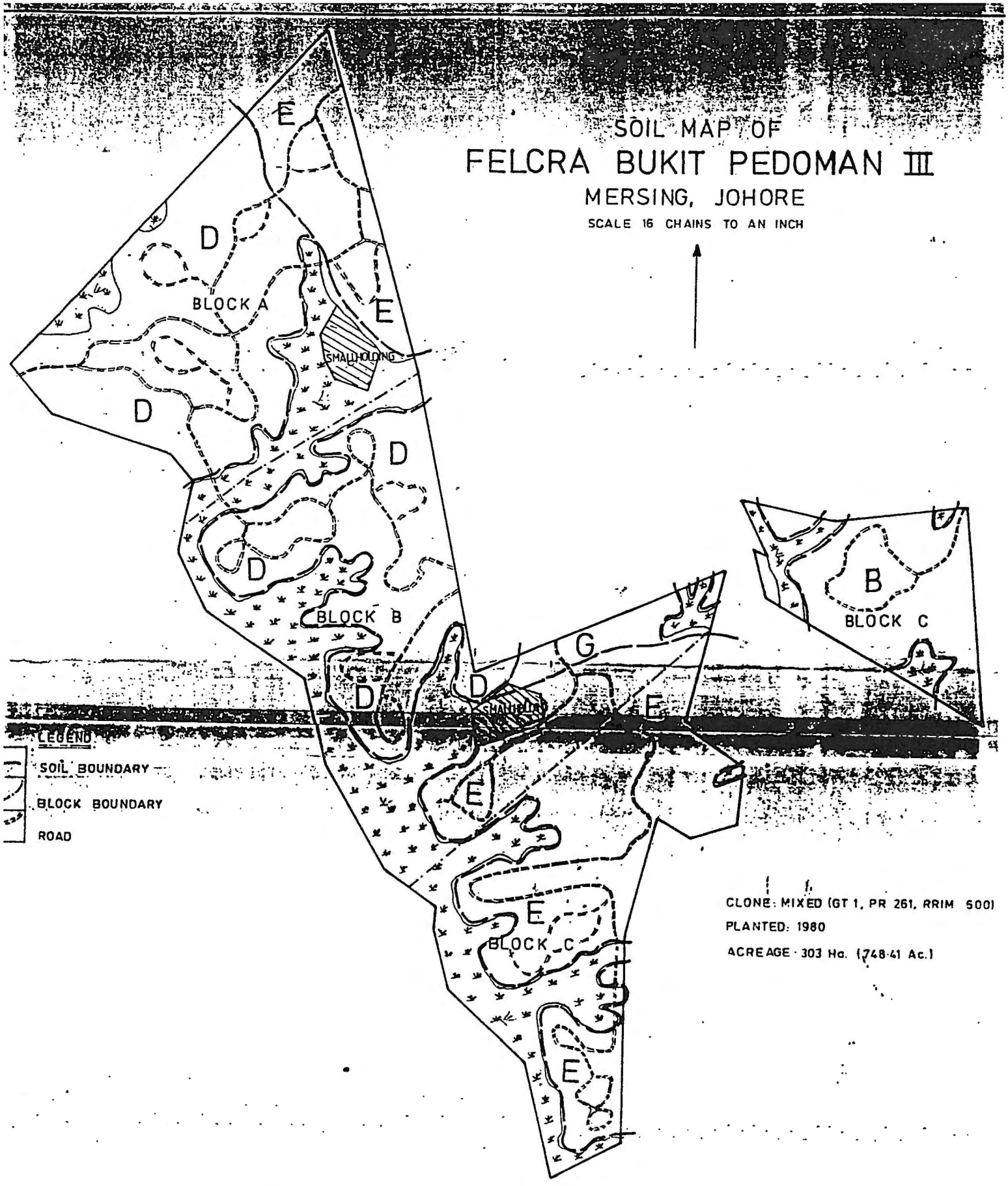
Girth — One measurement at 1.70 m above the ground at the beginning of trial and at yearly intervals.
All tappable trees are measured.

Stand per ha by task every six months : May and November
- total trees
- trees in tapping
- dry trees.

Annexes :
- Calendar of tapping days.
- Map of treatment repartition.
- Diagram of pannel.

SOIL MAP OF
FELCRA BUKIT PEDOMAN III
MERSING, JOHORE

SCALE 16 CHAINS TO AN INCH



Soil Mapping Unit	Soil Characteristic
B - Padang Besar/Batu Lapan Association	Clay; shallow/moderately deep; rolling to hilly terrain; moderately well drained; severely eroded.
D - Kuala Brang/Bungor Association	Sandy clay to clay; moderately deep to deep; hilly to steep terrain; moderately well drained; severely eroded.
E - Pohoi/Kuah Association	Clay; moderately deep/shallow; hilly to steep terrain;

Protocol

Demonstration Plot No. 5

1.Objective

This demonstration plot aims to reduce the need of workers by reducing the frequency of tapping and using stimulation to maintain the level of yield per hectare obtained with classical S/2 d/2.

2.Localisations

State : JOHOR Scheme : **BUKIT PEDOMAN I**

3.Environmental conditions

* Soil Serie : Kuala Brang, Bungur Class :
  Description :

  Terrain: Hilly

* Climate Rainfall (1985-1990); mm ; days (1986-89)

Month	1	2	3	4	5	6	7	8	9	10	11	12
Total mm	332	83	193	134	126	110	149	153	164	195	393	476
Number of days	19	7	13	4	12	15	14	13	15	18	24	23

Total 2508 mm, 184 days

4.History of demonstration plots

* Clones: GT 1 (80%), RRIM 600 and PR 261 (20%)

* Planting Year :10/1977
  Method :Seed at stakes
  Budding :
  Stand/ha at planting : 448
  actual : 282
  Planting distance : 9.14 x 2.44 m

* Opening Year : 7/1986
  Height : 1,10 m, pannel B 1.70 m on 1/1990
  Tapping : 1/2S d/2 6d/7

5. Treatments

3 treatments (123) replicated 4 times (ABCD) : 12 tasks of about 500 trees (1 treatment per task)

Number	Colour	Tapping	Stimulation	Pannel
1	Green	1/2S d/2	No	BO-2
2	Yellow	1/2S d/3	ET 2.5% Pa 1(1) 6/y	"
3	Red	1/2S d/4	ET 2.5% Pa 1(1) 8/y	"

Length of spiral : 1/2S on panel B at ... m from the soil.

Frequency of tapping : d/2 6 d/7, d/3 6 d/7, d/4 6 d/7

Bark consumption : with 300 tapping days per year.

Frequency	mm/tapping	Number tapping	cm/month	cm/year	cm/6 months
d/2	1.5	150	1.9	23	12
d/3	1.6	100	1.3	16	8
d/4	1.7	75	1.1	13	7

Half-yearly bark consumption guide had to be traced.

Depth of tapping : 1 to 1,5 mm to cambium.

Stimulation : ETHREL (Rhône-Poulenc) ready mix 5% a.i. (CEP) diluted to 2.5% with water or ready mix 2.5% (CEP).

Pannel application of 1.0 g of stimulant per tree on 1 cm of renewing bark just above the tapping cut. No lace removal.

Date of application excluding the wintering period. First stimulation after refoliation, then every one or two months.Not during the heavy raining season. Application two or three days before the tapping day.

Month	1	2	3	4	5	6	7	8	9	10	11	12
6/y				X			X	X	X		X	X
8/y	X			X			X	X	X	X	X	X

6. Preliminary data

For the twelve tasks :

* Number of tappable trees and total trees.
* Girth of tappable tree (with three dots).
* Yield of the last two or three months.

7. Controls

Yield — Task yield is recorded at every tapping. Latex is weighed and the DRC of latex from each task is determined by metrolac method to obtain the weight of latex dry rubber. Cup lump of each task is weighed and a coefficient of 0.5 is applied to obtain the weight of cup lump dry rubber.

Girth — One measurement at 1.70 m above the ground at the beginning of trial and at yearly intervals.
All tappable trees are measured.

Stand per ha by task every six months : May and November
- total trees
- trees in tapping
- dry trees.

Annexes :
- Calendar of tapping days.
- Map of treatment repartition.
- Diagram of pannel.

Calendar of tapping

For demonstration plots number 5

12 tapping tasks from A1 to D3.

Replications must be tapped on differents days: influence of climate and rainy days will be included in replications and not in treatments.

Tapper	a	b	c	d	e
Monday	A1	C1	A2	C2	A3
Tuesday	B1	D1	B2	D2	B3
Wednesday	A1	C1			C3
Thursday	B1	D1			D3
Friday	A1	C1	A2	C2	A3
Saturday	B1	D1	B2	D2	B3
Sunday					
Monday	A1	C1	A2	C2	C3
Tuesday	B1	D1	B2	D2	D3
Wednesday	A1	C1			A3
Thursday	B1	D1			B3
Friday	A1	C1	A2	C2	C3
Saturday	B1	D1	B2	D2	D3

On monday, tapper "a" taps replication A of traitement 1
tapper "b" taps replication C of traitement 1
On tuesday tapper "a" taps replication B of traitement 1

With friday tapping rest or in case of rainy day, treatments are shifted.

Protocol

Demonstration Plot No. 6

1.Objective

This demonstration plot aims to reduce the need of workers by reducing the frequency of tapping and using stimulation to maintain the level of yield per hectare obtained with classical S/2 d/2.

2.Localisations

State : PERLIS Scheme : **ULU PAUH I and II**

3.Environmental conditions

* Soil Serie : Jitra Class :
  Description : Fine sandy clay loam, shallow, moderatly drained
  Terrain: Undulating

* Climate Rainfall ~~(1985-1990)~~ : mm (1957-90) days (1986-89)

Month	1	2	3	4	5	6	7	8	9	10	11	12
Total mm	22	23	109	147	149	132	159	208	218	336	222	70
Number of days	2	2	8	13	9	10	11	13	20	19	15	6

Total : 1 873 mm, 126 days

4.History of demonstration plots

* Clones: RRIM 600 (100%)

* Planting Year :1970
  Method : Seed at stake
  Budding : 1970
  Stand/ha at planting : 398
  Planting distance : 4,14 x 2,74 m

* Opening Year : 5/1979
  Height : 1,40 m, pannel C 1.60 m on 1/1989
  Tapping : 1/2S d/2 6d/7

5. Treatments

4 treatments (1234) replicated 3 times (ABC) : 12 tasks of about 500 trees (1 treatment per task)

Number	Colour	Tapping	Stimulation	Pannel
1	Green	1/2S d/2	No	BI-1,2
2	Yellow	1/2S d/3	ET 2.5% Pa 1(1) 10/y	"
3	Red	1/2S d/4	ET 2.5% Pa 1(1) 10/y	"
4	Blue	1/4S/d/3	ET 5.0% Pa 1(1) 10/y	HO-1

Length of spiral : 1/2S on panel C or D at ... m from the soil and 1/4S upward tapping at ...m.

Frequency of tapping : d/2 6 d/7, d/3 6 d/7, d/4 6 d/7

Bark consumption : with 300 tapping days per year.

Frequency	mm/tapping	Number tapping	cm/month	cm/year	cm/6 months
d/2	1.5	150	1.9	23	12
d/3	1.6	100	1.3	16	8
d/4	1.7	75	1.1	13	7

Half-yearly bark consumption guide had to be traced for downward and upward tapping cuts.

Depth of tapping : 1 to 1,5 mm to cambium.

Stimulation : ETHREL (Rhône-Poulenc) ready mix 5% a.i.(CEP) for upward tapping and diluted to 2.5% with water or ready mix 2.5% for downward tapping.

Pannel application of 1.0 g of stimulant per tree on 1 cm of renewing bark just below (1/4S) or above (1/2S) the tapping cut. No lace removal.

Date of application excluding the wintering period. First stimulation after refoliation, then every one months.Not during the heavy raining season. Application two or three days before the tapping day.

Month	1	2	3	4	5	6	7	8	9	10	11	12
10/y	X			X	X	X	X	X	X	X	X	X

6. Preliminary data

For the twelve tasks :

* Number of tappable trees and total trees.
* Girth of tappable tree (with three dots).
* Yield of the last two or three months.

7. Controls

Yield — Task yield is recorded at every tapping. Latex is weighed and the DRC of latex from each task is determined by metrolac method to obtain the weight of latex dry rubber. Cup lump of each task is weighed and a coefficient of 0.5 is applied to obtain the weight of cup lump dry rubber.

Girth — One measurement at 1.70 m above the ground at the beginning of trial and at yearly intervals.
All tappable trees are measured.

Stand per ha by task every six months : May and November
- total trees
- trees in tapping
- dry trees.

Annexes :
- Calendar of tapping days.
- Map of treatment repartition.
- Diagram of pannel.

Calendar of tapping

For demonstration plots number 6 and 7

12 tapping tasks from A1 to C4.

Replications must be tapped on differents days: influence of climate and rainy days will be included in replications and not in treatments.

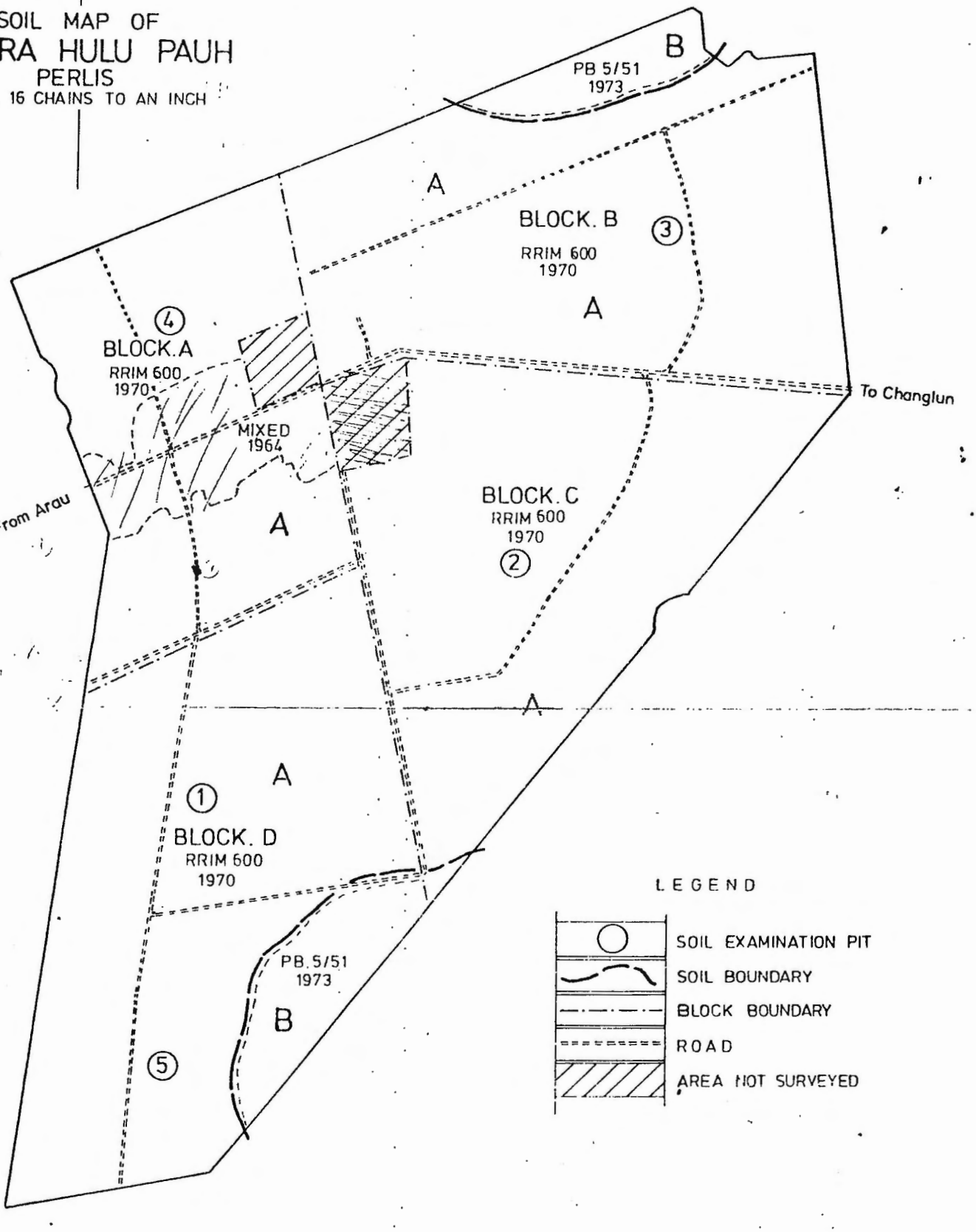
Tapper	a	b	c	d	e
Monday	A1	C1	A2	A3	A4
Tuesday	B1		B2	B3	B4
Wednesday	A1	C1	C2	C3	C4
Thursday	B1		A2		A4
Friday	A1	C1	B2	A3	B4
Saturday	B1		C2	B3	C4
Sunday					
Monday	A1	C1	A2	C3	A4
Tuesday	B1		B2		B4
Wednesday	A1	C1	C2	A3	C4
Thursday	B1		A2	B3	A4
Friday	A1	C1	B2	C3	B4
Saturday	B1		C2		C4

On monday, tapper "a" taps replication A of traitement 1
tapper "b" taps replication C of traitement 1
On tuesday tapper "a" taps replication B of traitement 1

With friday tapping rest or in case of rainy day, treatments are shifted.

SOIL MAP OF FELCRA HULU PAUH PERLIS

SCALE 16 CHAINS TO AN INCH



Soil Mapping Unit	Soil Characteristics
A - Jitra Series	Shallow, fine sandy clay loam, undulating terrain, moderately to poorly drained; slightly eroded.
B - Kedah series	Shallow, fine sand clay, hilly terrain, moderately well drained, moderately eroded.

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SB

S 1120 / 5

Protocol
Demonstration Plot No. 7

1.Objective

This demonstration plot aims to reduce the need of workers by reducing the frequency of tapping and using stimulation to maintain the level of yield per hectare obtained with classical S/2 d/2.

2.Localisations

State : KEDAH Scheme : **BUKIT TAMPOI I**

3.Environmental conditions

* Soil Serie : Jitra Class :
Description : Fine sandy clay, shallow, laterite layer as hard pan.
Terrain: Undulating

* Climate Rainfall (1985-1990):

Month	1	2	3	4	5	6	7	8	9	10	11	12
Total mm	6	57	105	245	192	100	160	176	276	321	212	73
Number of days	2	3	7	11	13	8	8	11	16	17	12	5

4.History of demonstration plots

* Clones: GT 1 (60%), RRIM 600 (20%) and PB 5/51 (20%).

* Planting Year :1972
Method : Seed at stakes
Budding :1973
Stand/ha at planting : 447
Planting distance : 9.14 x 2.44

* Opening Year : 7/1981
Height : pannel C 1.40 m
Tapping : 1/2S d/2 6d/7

5. Treatments

4 treatments (1234) replicated 3 times (ABC) : 12 tasks of about 500 trees (1 treatment per task)

Number	Colour	Tapping	Stimulation	Pannel
1	Green	1/2S d/2	No	BI-1,2
2	Yellow	1/2S d/3	ET 2.5% Pa 1(1) 10/y	"
3	Red	1/2S d/4	ET 2.5% Pa 1(1) 10/y	"
4	Blue	1/4S/d/3	ET 5.0% Pa 1(1) 10/y	HO-1

Length of spiral : 1/2S on panel C or D at ... m from the soil and 1/4S upward tapping at ...m.

Frequency of tapping : d/2 6 d/7, d/3 6 d/7, d/4 6 d/7

Bark consumption : with 300 tapping days per year.

Frequency	mm/tapping	Number tapping	cm/month	cm/year	cm/6 months
d/2	1.5	150	1.9	23	12
d/3	1.6	100	1.3	16	8
d/4	1.7	75	1.1	13	7

Half-yearly bark consumption guide had to be traced for downward and upward tapping cuts.

Depth of tapping : 1 to 1,5 mm to cambium.

Stimulation : ETHREL (Rhône-Poulenc) ready mix 5% a.i.(CEP) for upward tapping (1/4S) and diluted to 2.5% with water or ready mix 2.5% for downward tapping (1/2S).

Pannel application of 1.0 g of stimulant per tree on 1 cm of renewing bark just below (1/4S) or above (1/2S) the tapping cut. No lace removal.

Date of application excluding the wintering period. First stimulation after refoliation, then every one months.Not during the heavy raining season. Application two or three days before the tapping day.

Month	1	2	3	4	5	6	7	8	9	10	11	12
10/y	X			X	X	X	X	X	X	X	X	X

6. Preliminary data

For the twelve tasks :

* Number of tappable trees and total trees.
* Girth of tappable tree (with three dots).
* Yield of the last two or three months.

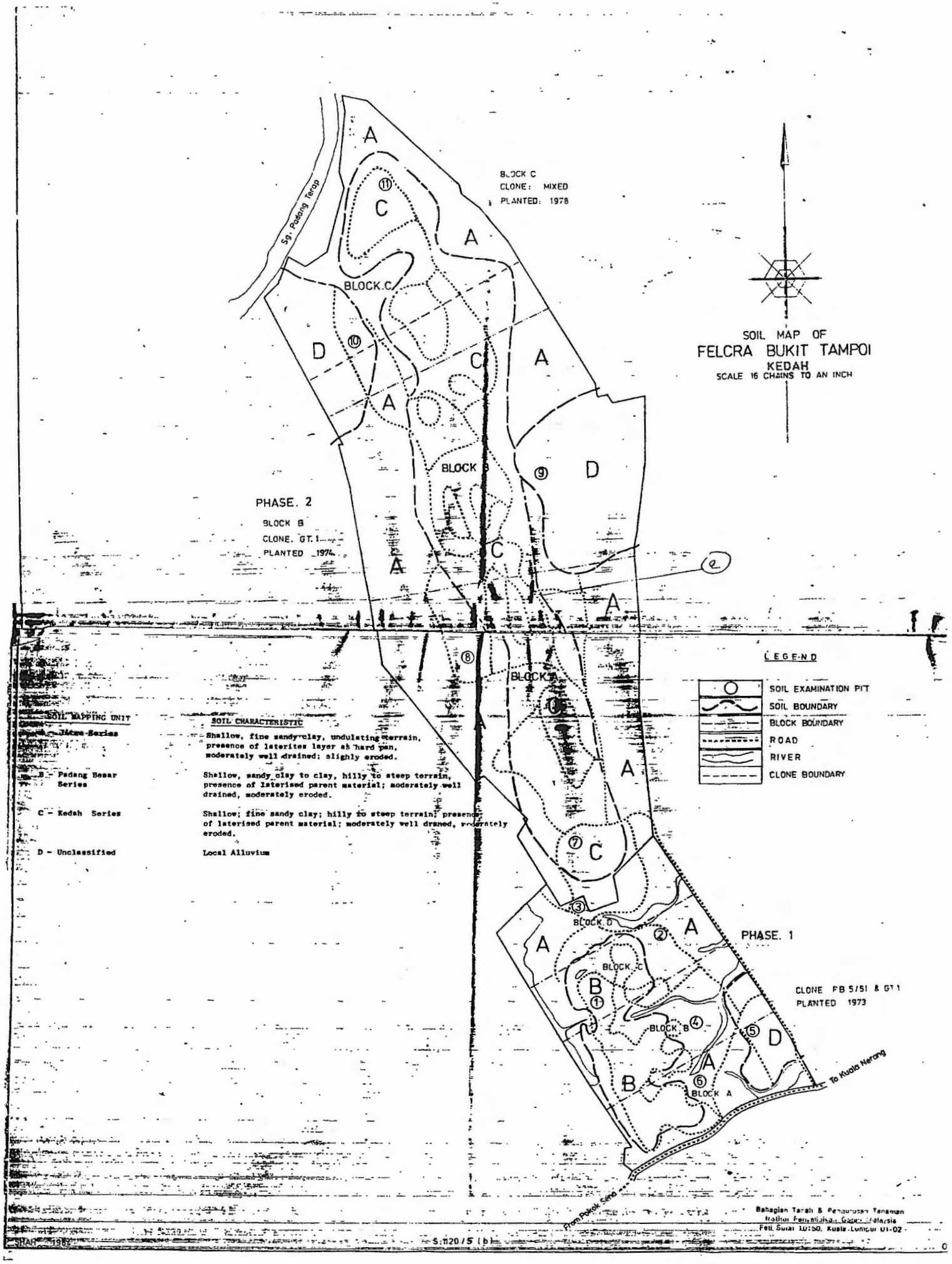
7. Controls

Yield — Task yield is recorded at every tapping. Latex is weighed and the DRC of latex from each task is determined by metrolac method to obtain the weight of latex dry rubber. Cup lump of each task is weighed and a coefficient of 0.5 is applied to obtain the weight of cup lump dry rubber.

Girth — One measurement at 1.70 m above the ground at the beginning of trial and at yearly intervals.
All tappable trees are measured.

Stand per ha by task every six months : May and November
- total trees
- trees in tapping
- dry trees.

Annexes :
- Calendar of tapping days.
- Map of treatment repartition.
- Diagram of pannel.


SOIL MAP OF
FELCRA BUKIT TAMPOI
KEDAH
SCALE 16 CHAINS TO AN INCH
BLOCK C
CLONE: MIXED
PLANTED: 1978
Sg. Padang Terap
BLOCK C
BLOCK B
BLOCK A
PHASE. 2
BLOCK B
CLONE. GT. 1
PLANTED 1974
PHASE. 1
BLOCK D
BLOCK C
BLOCK B
BLOCK A
CLONE PB 5/51 & GT 1
PLANTED 1973
To Kuala Nerang
From Pokok Sena
LEGEND
SOIL EXAMINATION PIT
SOIL BOUNDARY
BLOCK BOUNDARY
ROAD
RIVER
CLONE BOUNDARY
SOIL MAPPING UNIT
SOIL CHARACTERISTIC
Jitra Series
Shallow, fine sandy clay, undulating terrain, presence of laterite layer as hard pan, moderately well drained; slighly eroded.
B - Padang Besar Series
Shallow, sandy clay to clay, hilly to steep terrain, presence of laterised parent material; moderately well drained, moderately eroded.
C - Kedah Series
Shallow; fine sandy clay; hilly to steep terrain; presence of laterised parent material; moderately well drained, moderately eroded.
D - Unclassified
Local Alluvium
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Institut Penyelidikan Getah Malaysia
Peti Surat 10150, Kuala Lumpur 01-02
S:1120/5 (b)

Protocol
Demonstration Plot No. 8

1.Objective

This demonstration plot aims to reduce the need of workers by reducing the frequency of tapping and using stimulation to maintain the level of yield per hectare obtained with classical S/2 d/2.

2.Localisations

State : KEDAH Scheme : BUKIT TAMPOI II

3.Environmental conditions

* Soil Serie : Jitra Class :
Description : Fine sandy clay, shallow, laterite layer as hard pan.
Terrain: Undulating, flat.

* Climate Rainfall (1985-1990):

Month	1	2	3	4	5	6	7	8	9	10	11	12
Total mm	6	57	105	245	192	100	160	176	276	321	212	73
Number of days	2	3	7	11	13	8	8	11	16	17	12	5

4.History of demonstration plots

* Clones: GT 1 (100%).

* Planting Year :1974
Method : Seed at stakes
Budding :1975
Stand/ha at planting : 447
Planting distance : 9.14 x 2.44

* Opening Year : 4/1983
Height : pannel C 1.60 m
Tapping : 1/2S d/2 6d/7

5. Treatments

5 treatments (12345) replicated 3 times (ABC) : 15 tasks of about 500 trees (1 treatment per task)

Number	Colour	Tapping	Stimulation	Pannel
1	Green	1/2S d/2	No	BI-1,2
2	Yellow	1/2S d/3	ET 2.5% Pa 1(1) 10/y	"
3	Red	1/2S d/4	ET 2.5% Pa 1(1) 10/y	"
4	Blue	1/4S d/3	ET 5.0% Pa 1(1) 10/y	HO-1
5	Black	1/4S d/4	ET 5.0% Pa 1(1) 12/y	HO-1

Length of spiral : 1/2S on panel C at ... m from the soil and 1/4S upward tapping at ...m.

Frequency of tapping : d/2 6 d/7, d/3 6 d/7, d/4 6 d/7

Bark consumption : with 300 tapping days per year.

Frequency	mm/tapping	Number tapping	cm/month	cm/year	cm/6 months
d/2	1.5	150	1.9	23	12
d/3	1.6	100	1.3	16	8
d/4	1.7	75	1.1	13	7

Half-yearly bark consumption guide had to be traced for downward and upward tapping cuts.

Depth of tapping : 1 to 1,5 mm to cambium.

Stimulation : ETHREL (Rhône-Poulenc) ready mix 5% a.i.(CEP) for upward tapping (1/4S) and diluted to 2.5% with water or ready mix 2.5% for downward tapping (1/2S).

Pannel application of 1.0 g of stimulant per tree on 1 cm of renewing bark just below (1/4S) or above (1/2S) the tapping cut. No lace removal.

Date of application excluding the wintering period. First stimulation after refoliation, then every one months.Not during the heavy raining season. Application two or three days before the tapping day.

Month	1	2	3	4	5	6	7	8	9	10	11	12
10/y												

6. Preliminary data

For the twelve tasks :

* Number of tappable trees and total trees.
* Girth of tappable tree (with three dots).
* Yield of the last two or three months.

7. Controls

Yield — Task yield is recorded at every tapping. Latex is weighed and the DRC of latex from each task is determined by metrolac method to obtain the weight of latex dry rubber. Cup lump of each task is weighed and a coefficient of 0.5 is applied to obtain the weight of cup lump dry rubber.

Girth — One measurement at 1.70 m above the ground at the beginning of trial and at yearly intervals.
All tappable trees are measured.

Stand per ha by task every six months : May and November
- total trees
- trees in tapping
- dry trees.

Annexes :
- Calendar of tapping days.
- Map of treatment repartition.
- Diagram of pannel.

Calendar of tapping

For demonstration plots number 8

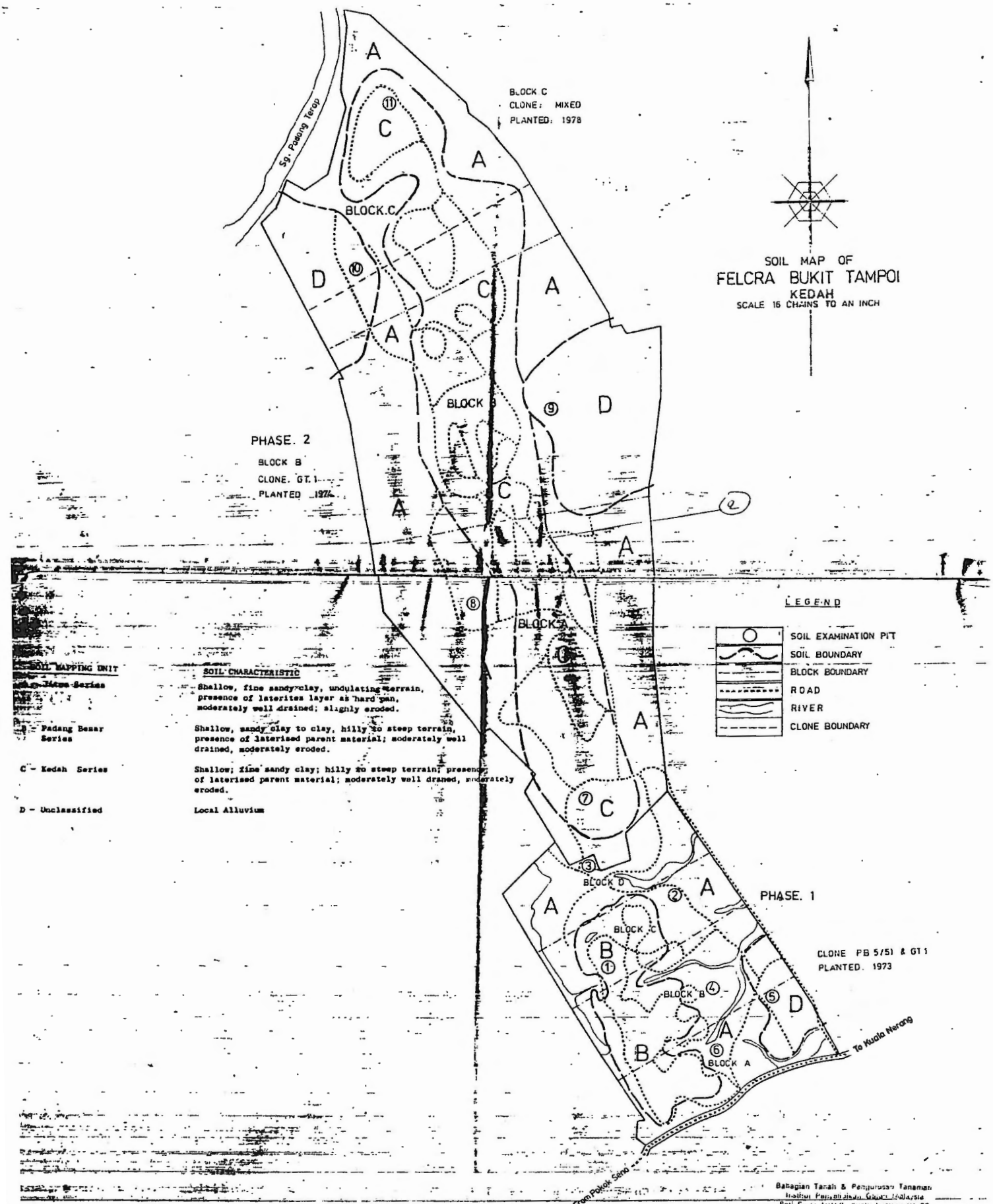
15 tapping tasks from A1 to C5.

Replications must be tapped on differents days: influence of climate and rainy days will be included in replications and not in treatments.

Tapper	a	b	c	d	e	f
Monday	A1	C1	A2	A3	A4	A5
Tuesday	B1		B2	B3	B4	B5
Wednesday	A1	C1	C2	C3	C4	C5
Thursday	B1		A2		A4	
Friday	A1	C1	B2	A3	B4	A5
Saturday	B1		C2	B3	C4	B5
Sunday						
Monday	A1	C1	A2	C3	A4	C5
Tuesday	B1		B2		B4	
Wednesday	A1	C1	C2	A3	C4	A5
Thursday	B1		A2	B3	A4	B5
Friday	A1	C1	B2	C3	B4	C5
Saturday	B1		C2		C4	

On monday, tapper "a" taps replication A of traitement 1
tapper "b" taps replication C of traitement 1
On tuesday tapper "a" taps replication B of traitement 1

With friday tapping rest or in case of rainy day, treatments are shifted.



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Peti Surat 10150, Kuala Lumpur 01-02
S.1120/5 (p)

Protocol
Demonstration Plot No. 9

1.Objective

This demonstration plot aims to reduce the need of workers by reducing the frequency of tapping and using stimulation to maintain the level of yield per hectare obtained with classical S/2 d/2.

2.Localisations

State : JOHOR Scheme : BUKIT KEREMOIYANG

3.Environmental conditions

* Soil Serie : ~~Jitra~~ (Gajah Mati, Durian) Class :
Description : Fine sandy clay, shallow, laterite layer as hard pan.
Terrain: Undulating

* Climate Rainfall (1985-1990); 5 mm days (1986-89)

Month	1	2	3	4	5	6	7	8	9	10	11	12
Total mm	215	94	320	199	166	142	137	163	291	168	285	164
Number of days	13	6	17	13	14	13	12	13	16	15	15	10

Total : 2 184 mm, 157 days.

4.History of demonstration plots

* Clones: RRIM 600 (100%)

* Planting Year : 5/1973
Method : Polybag Budded Stump
Budding : 1973
Stand/ha at planting : 398
Planting distance : 5,14 x 2,74 mm

* Opening Year : 5/1980
Height : 1,40 mm
Tapping : 1/2 S d/2 6d/7

5. Treatments

4 treatments (1234) replicated 3 times (ABC) : 12 tasks of about 500 trees (1 treatment per task)

Number	Colour	Tapping	Stimulation	Pannel
1	Green	1/2S d/2	No	BI-1,2
2	Red	1/2S d/4	ET 2.5% Pa 1(1) 10/y	"
3	Blue	1/4S/d/3	ET 5.0% Pa 1(1) 10/y	HO-1
4	Black	1/4S/d/4	ET 5.0% Pa 1(1) 12/y	HO-1

Length of spiral : 1/2S on panel C or D at ... m from the soil and 1/4S upward tapping at ...m.

Frequency of tapping : d/2 6 d/7, d/3 6 d/7, d/4 6 d/7

Bark consumption : with 300 tapping days per year.

Frequency	mm/tapping	Number tapping	cm/month	cm/year	cm/6 months
d/2	1.5	150	1.9	23	12
d/3	1.6	100	1.3	16	8
d/4	1.7	75	1.1	13	7

Half-yearly bark consumption guide had to be traced for downward and upward tapping cuts.

Depth of tapping : 1 to 1,5 mm to cambium.

Stimulation : ETHREL (Rhône-Poulenc) ready mix 5% a.i.(CEP) for upward tapping (1/4S) and diluted to 2.5% with water or ready mix 2.5% for downward tapping (1/2S).

Pannel application of 1.0 g of stimulant per tree on 1 cm of renewing bark just below (1/4S) or above (1/2S) the tapping cut. No lace removal.

Date of application excluding the wintering period. First stimulation after refoliation, then every one months.Not during the heavy raining season. Application two or three days before the tapping day.

Month	1	2	3	4	5	6	7	8	9	10	11	12
10/y												
12/y												

6. Preliminary data

For the twelve tasks :

* Number of tappable trees and total trees.
* Girth of tappable tree (with three dots).
* Yield of the last two or three months.

7. Controls

Yield — Task yield is recorded at every tapping. Latex is weighed and the DRC of latex from each task is determined by metrolac method to obtain the weight of latex dry rubber. Cup lump of each task is weighed and a coefficient of 0.5 is applied to obtain the weight of cup lump dry rubber.

Girth — One measurement at 1.70 m above the ground at the beginning of trial and at yearly intervals.
All tappable trees are measured.

Stand per ha by task every six months : May and November
- total trees
- trees in tapping
- dry trees.

Annexes :
- Calendar of tapping days.
- Map of treatment repartition.
- Diagram of pannel.

Calendar of tapping

For demonstration plots number 9

12 tapping tasks from A1 to C4.

Replications must be tapped on differents days: influence of climate and rainy days will be included in replications and not in treatments.

Tapper	a	b	c	d	e
Monday	A1	C1	A2	A3	A4
Tuesday	B1		B2	B3	B4
Wednesday	A1	C1	C2	C3	C4
Thursday	B1			A3	
Friday	A1	C1	A2	B3	A4
Saturday	B1		B2	C3	B4
Sunday					
Monday	A1	C1	C2	A3	C4
Tuesday	B1			B3	
Wednesday	A1	C1	A2	C3	A4
Thursday	B1		B2	A3	B4
Friday	A1	C1	C2	B3	C4
Saturday	B1			C3	

On monday, tapper "a" taps replication A of traitement 1
tapper "b" taps replication C of traitement 1
On tuesday tapper "a" taps replication B of traitement 1

With friday tapping rest or in case of rainy day, treatments are shifted.

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TECHNICAL FORM N° E2

CONTROL OF TAPPING QUALITY

As the yield and quality of output from rubber plantations depends on tapping quality, regular checks are always necessary.

In practical terms, bonuses given to the tapper according to tapping quality are the only incentive for good tapping. They must be incentive enough to motivate the tapper as well as the head of team.

Once a month each tapping task is quality controlled, by checking 5 trees per task chosen at random.

For each quality controlled tree the maximum potential mark is 50 points (corresponding to a "perfect" quality). according to the quality of tapping as checked on the tree, the tapper receives a mark, which determines the bonus :

For example : a mark of 35 points, if the unit is 2 M$, will give a Bonus of 35 x 2 = 70 M$.

The marking system can be divided up as follows :

. 15 points for wounds
. 15 points for tapping™depth
. 10 points for bark consumption
. 5 points for the slope
. 5 points for cleanliness.

1. WOUNDS

Wounds can cause bark dryness, help disease enter the tree, and cause scarring patches which makes the future tapping difficult. Each team leader should mark the tapping wounds with a chalk sign on the panel.

a) There will be no penalty :
- if the wounds are superficial (less than 1 cm length) and if they have been cured.
- or if the wounds were made by accident.

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b) There will be a penalty :
- if the wounds are more than 1 cm deep :
  penalty = -1 point per cm.

- if the wounds were repeated and not corrected (i.e. if the tapper did not tap outwards after wounding the tree) penalty = -1 point.

- for each wound which has not been properly cured :
  penalty = -1 point per not cured wound
  (for curing the wounds, the tapper should always havea small box of curing fat).

. then the total penalty shall be multiplied by the length of the wounds and by the number of wounds (no. of cms).

. on the contrary : if the wound has been cured, and if the tapper has corrected his fault by tapping outwards, then the penalty will be divided by 2.

2. TAPPING DEPTH

The tapping depth should be measured as follows :

- with a screw driver or a sygmat,
- by three measurements per tree : one in the high part of the tapping cut, one in the middle, one in the low part of the cut.

The ideal tapping depth should be 1 mm away from the cambium. it must not be less than 0,5 mm, and not more than 1,5 mm away from the cambium.

The penalty system is as follows :

* depth between 0 and 0,5 mm -----> wound (see 1).
* between 1,5 and 2 mm -----> penalty = -1 point/measurement
* between 2 and 3 mm -----> penalty = -2 points/measurement
* more than 3 mm -----> penalty = -4 points/measurement

3. BARK CONSUMPTION

The bark consumption should be evaluated by using painting dots. Each year, at defoliation, 3 dots should be painted on the place where the new cut will start as a guide for the measurement of yearly consumption. Then measurements can be made on three spots : in the high part, in the middle and in the low part of the cut.

The following consumptions can be allowed :

-	opening of the tree	:	10 mm
-	Re-opening (after resting)	:	5 mm
-	tapping	:	1,2 to 1,3 mm with d/2 6d/7 1,3 to 1,5 mm with d/3 6d/7 1,5 to 1,7 mm with d/4 1,8 to 2 mm with d/6 1,8 to 2 mm with upwards tapping

For example, afer n days of tapping, with d/3 6d/7, and after a re-opening, the consumption should be : $c = 5 + (n \times 1,4)$ mm

With the usual d/3 6d/7 tapping, the annual bark consumption should be under 15 cm.
With d/4, it should be under 13 cm
With d/6, under 10 cm
With upwards tapping, it should be under 20 cm.

- If the consumption is too low, then the production is too low (some of the latex vessels remain obstructed). If the consumption is too high, panels may not be exploited properly.

- To allow a good consumption, some guiding marks should be painted or traced on the tree, to help the tapper.

- The penalty system should be as follow :
  penalty = -1 point for each extra mm (per year)
  -1 point for each mm less than usual (per year)

4. SLOPE

The slope is not measured, it is estimated by looking at the trees, if the tracing is made properly, then the slope should be : 30 to 33 ° for downwards tapping, 42 to 45° for upwards tapping.

If the slope is too horizontal, some latew might flow outside and be lost, whereas if the slope is too vertical, bark consumption might increase.

The penalty system for incorrect slope could be as follows (according to the severity of incorrect slope) :

- minus point for incorrect slope at the high part or the low part of the cut.

- 2 points or 3 points for incorrect slope at the middle part of the cut.

ANNEX Example of a Control Sheet

NAME OF THE TAPPER

TEAM

Matricule Number
Parcel Number
Localization
Clone and date of planting :

Date	Tree Number	Wounds (15)			depth (mm) (15)				Consumption (mm) (10)				Slope (5)	Cleanliness (5)					Lost latex (5)	omitted trees (15)	Assiduity	TOTAL POINTS
		Length (cm)	Not cured	POINTS	High	Middle	Low	POINTS	High	Middle	Low	POINTS		Tapping cut	Panel	Furnishing	Polybag	POINTS				
	1	-	NS	1	1,5	1,5	2,0	1	4	2	2	8	1			1	5	6		x		
	2	1,5	NS	2	0,5	1,5	1,5	-	4	2	1	7	1			1		1	5			
	3	-	NS	1	2,0	2,0	2,0	3	3	2	1	6	2	1		1		2				
	4	2,0	NS	3	2,0	1,5	2,0	2	3	3	1	7	1			1		1				
	5	-	NS	1	1,5	1,0	1,0	-	4	2	1	6	1		1	1		2				
				8				6				34	6					12	5	15		86
	1																					
	2																					
	3																					
	4																					
	5																					
	1																					
	2																					
	3																					
	4																					
	5																					

Maximum marks 3 x 5 x 50 = 750

Total of penalties :

Points for tapping :

Bonus for tapping :
Bonus for assiduity :
Bonus for care of panels :
Bonus for stimulation :
Others :
Total of bonuses :